Quality Assurance Project Plan
Title and Approval Sheet
Version 1.0, December 23, 2001
"Great Lakes Sediment Data Support"
IAG No.: DW13947973-01

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1. SUMMARY

1.1 Purpose

The U.S. EPA's Great Lakes National Program Office (GLNPO) and the National Oceanic and Atmospheric Administration (NOAA) are coordinating on a project to develop and populate a database system to house GLNPO's historical and future sediment data. Under the project sediment data will be formatted using NOAA's existing Query Manager (QM) database format for use in the MARPLOT visualization software, a general-purpose mapping application. Additionally, this data will be stored for many years and will be made available to other federal, state, and local agencies, as well as private citizens and companies as requested. Therefore, it is important to ensure that a high quality database is created.

In order to ensure construction a high quality database, it is important that certain quality control/quality assurance (QA/QC) actions be followed during development and population of the database. The Quality Assurance Project Plan (QAPP) details the required QA/QC components to be adhered to during this project.

1.2 Background

Since 1993, GLNPO has been providing funds for the assessment of sediments within the Great Lakes Basin, through an annual grants program. The data collected during these sediment assessment surveys has been primarily used by GLNPO and the grantee to determine current sediment quality conditions, to prioritize sediment management decision, and for site-specific program-focused objectives (i.e., regulatory enforcement). For these purposes, it was considered unnecessary to house the data in a relational database, since each of the individual programs only dealt with a relatively small amount of data, and the data was primarily stored in hard copy format, or in electronic spreadsheet tables.

However, in recent years, GLNPO has received numerous requests for sediment data for use in determining spatial and temporal trends (e.g. the National Sediment Inventory), prioritizing sediment management decisions on a regional basis, and other potential uses. It has become apparent that the current format of the GLNPO sediment data was too unwieldy for widespread dissemination. The QM database format provides several advantages over other existing database formats, including:

1. Ability to incorporate both chemical and toxicity testing data,
2. Compatibility with the universally available MS ACCESS database system, and
3. Steam-lined compatibility with the existing and universally available MARPLOT visualization software.

Therefore, the QM format was selected for use with the GLNPO sediment data.

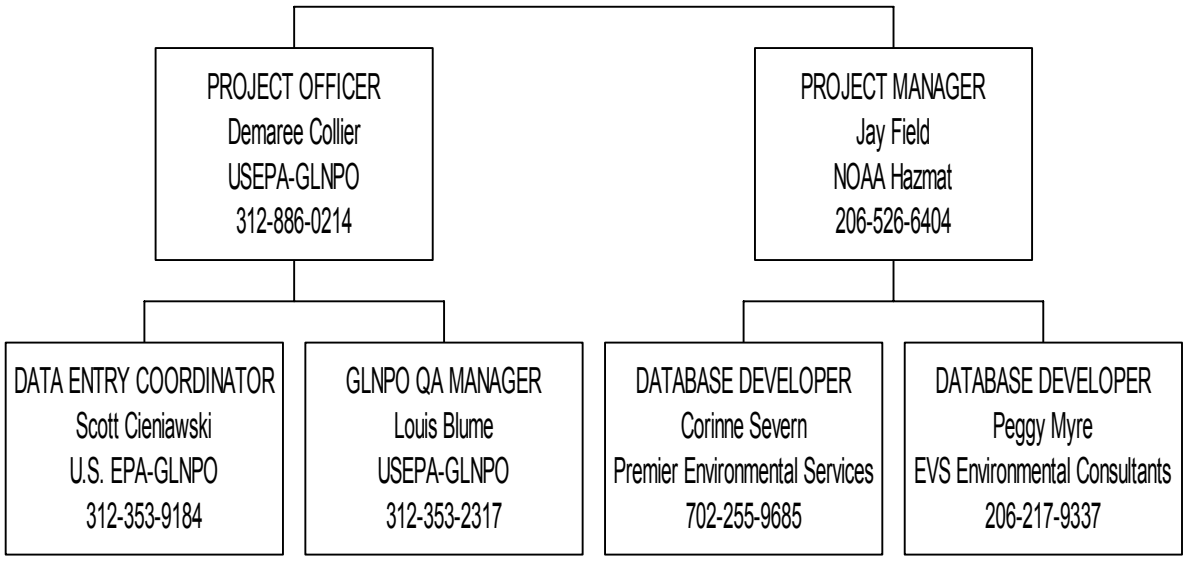
Several complicated, time-intensive, and error-prone steps will be required in order to convert the sediment data from its current format into the QM format for use with the MARPLOT software. It is important, therefore, that the QA/QC steps detailed in this document be adhered to during population and development of the database. The rest of this document details the

responsibilities, tasks, and QA/QC efforts necessary to ensure the development of a high-quality sediment database.

1.3 Project Organization

Table 1 provides a summary of the project organization for this project. A description of the duties of each of the major participants in the population of the database is provided below.

Figure 1. Organizational Chart



USEPA-GLNPO

USEPA-GLNPO is currently in charge of data management for the data sets to be used on this project., and GLNPO and it's Great Lakes partners will be the principal users of the sediment database.

GLNPO is responsible for development of the project QAPP, data input and conversion, and QA/QC reviews of the candidate data sets prior to and after inclusion into the Query Manager formate. USEPA-GLNPO staff associated with this project include:

Person:	***Responsibilities:***
Demaree Collier	Coordinate GLNPO and NOAA Activities
Project Officer	Approve Work Plan and QAPP
77 W. Jackson Blvd. (G-17J)	Participate in QA/QC Review of Candidate Data Sets
Chicago, IL 60604	Participate in Data Entry Activities
phone: 312-886-0214	Participate in QA/QC Review of Formatted Data Sets
collier.demaree@epa.gov	Participate in Query Manager Training
	Controls and tracks the release of data to requestors

Scott Cieniawski Data Entry Coordinator 77 W. Jackson Blvd. (G-17J) Chicago, IL 60604 phone: 312-353-9184 cieniawski.scott@epa.gov	Prepare QAPP Participate in QA/QC Review of Candidate Data Sets Participate in Data Entry Activities Participate in QA/QC Review of Formatted Data Sets Participate in Query Manager Training
Louis Blume GLNPO QA Manager 77 W. Jackson Blvd. (G-17J) Chicago, IL 60604 phone: 312-353-2317 blume.louis@epa.gov	Review/Approve QAPP

National Oceanic and Atmospheric Administration

NOAA representatives will contract management, technical support, and database and MARPLOT software training for this project. NOAA representatives involved in this project include:

Person:	***Responsibilities:***
Jay Field Project Manager NOAA Hazmat (N/ORCA3) 7600 Sand Point Way NE Seattle, Washington 98115 Phone: 206-526-6404	Contract for database development Contract and coordinate computer training Provide technical support on database formatting questions to USEPA Review and Approve QAPP Review technical documentation for database

Contractors

The contractors will be responsible for development of data tools and documentation as directed by the NOAA project manager.

Person:	***Responsibilities:***
Peggy Myre EVS Environmental Consultants Phone: 206-217-9337	Develop User Interface for Database Conversions Provide training on use of database Prepare technical documentation on database format
Corrine Severn Premier Environmental Services 13900 Panay Way, Suite SR 305 Marina del Rey, CA 90292 Phone: 310-578-9667	Develop User Interface for Database Conversions Provide training on use of database Prepare technical documentation on database format

2. Project Description

2.1 Expected Measurements and Data Uses

No new sediment surveys will be undertaken as part of this project. Instead, historical sediment quality data will be compiled, evaluated and used to populate a sediments database utilizing the existing database structure, Query Manager. This project is intended to provide data from GLNPO-sponsored sediment sampling surveys to all interested users in a consistent, usable format.

Currently, the database structure is only set up to handle data relating to the collection and analysis of sediment and tissue chemistry and biological toxicity samples. Information that we expect to compile and format during this data compilation effort includes:

1. Results of Sediment Chemistry Analysis (including QA/QC samples),
2. Results of Biological Toxicity Testing (including QA/QC samples),
3. Loctaional Information on Sampling Points,
4. Information on Principal Investigator(s), and
5. Information on Physical Attributes of Samples.

This GLNPO sediment database will have several useful applications, including allowing users:

1. Open, easy data on sediment chemistry, biological testing, and physical properties of sediments,
2. To view and analyze data spatially on electronic mapping software,
3. To perform spatial and temporal trends analysis on the data,
4. To identify priority sites for additional investigations or sediment management decisions,
5. To make decisions regarding the quality and usability of the data for their intended purposes,
6. Include GLNPO data in site specific, regional, and national sediment inventories,
7. Compare this data to data collected in other surveys, and
8. Other unanticipated uses of the data.

2.2 Description of Work to be Performed

The following work items (described in Chapeter 3) are required to be accomplished during this project:

1. Development of User Interface to Convert data from MS Excel format to MS Access format,
2. Identification and QA/QC Evaluation of Candidate Data Sets,
3. Input Data into Query Manager MS Excel Data Format,
4. QA/QC Evaluation of MS Excel formatted data,
5. Convert data from MS Excel to MS Access format,
6. QA/QC Evaluation of MS Access formatted data.,
7. Produce technical guidance for formatting and converting data sets,
8. Maintain custodial records of electronic and hard copy data sets.

2.3 Special Personnel, Training, and Equipment Requirements

Database Population and Use

Formatting data for inclusion into the GLNPO database is a complicated process and requires knowledge or training in MS Excel, MS Access, the Query Manager data reporting format, the data conversion routines to convert data from MS Excel to MS Access format, and MARPLOT visualization software. NOAA personnel and contractors will train GLNPO personnel on the use of the QM system and MARPLOT software during a 2-day training session to be held in November 2001.

Technical guidance for the conversion routines will be provided as part of this project. Training in the reporting format, data conversion, and the MARPLOT software will also take place as part of this project. Familiarity with MS Excel and MS Access will be required of those participating in the data entry and/or conversion process.

2.4 Project Schedule

A tentative project schedule is provided in Table 3. All personnel shown in Figure 1 should be contacted regarding significant schedule changes.

Table 1. Tentative Project Schedule

Task	Completion Date
Training for GLNPO Personnel	November 15, 2001
Production of Conversion Routines	December 31, 2001
QAPP Development and Sign-Off	January 15, 2002
Selection and Evaluation of Candidate Data Sets	January 31, 2002
Input Data Sets into MS Excel Format	February 7, 2002
QA/QC Evaluation of MS Excel Formatted Data	February 15, 2002
Conversion of Data into MS Access Format	February 20, 2002
QA/QC Evaluation of MS Access Formatted Data	February 28, 2002
Production of Technical Guidance for Conversion Process	March 31, 2002

3. QA/QC Requirements for Population and Use of Database

There are five main project tasks where it is critical for the project participants to implement thorough QA/QC strategies, in order to ensure the success of the project. These tasks include:

1. Identify and Evaluate Candidate Data Sets,
2. Check Data after Inputting into Query Manager MS Excel Data Format,
3. Check Data after Converting from MS Excel to MS Access format,
4. Provide Users with Proper Qualification Codes and Documentation to Aid Proper Use of Data, and
5. Maintain custodial records of electronic and hard copy data sets.

Each of these tasks are vital to producing a quality database, as well as, for troubleshooting potential problems during the project. The QA/QC strategies required for each of these five project tasks are described in detail in the remainder of Section 3.

The QA/QC review process will be documented using the Data Quality Documentation Checksheet provided in Appendix A.

3.1 Identification and Evaluation of Candidate Data Sets

All sediment chemistry and toxicity data collected and/or analyzed since 1993 utilizing GLNPO funding is considered eligible for inclusion in this database. However, GLNPO has determined that the data sets to be included in this sediment database must meet the following criteria:

1. Data must have been collected and analyzed under a QAPP or QMP approved by GLNPO,
2. GLNPO must have possession of Final Approved QAPP and a copy of the Laboratory Data Report Package (either electronic or hard copy). Minimum requirements for this report are provided in Appendix B,
3. Data must pass the Post-Sampling QA/QC Audit Checklists provided in Appendix C, and
4. Data Analysis must have been performed utilizing standard method and procedures, wherever available (e.g. ASTM, SW-846, etc.).

***** GLNPO Representatives will be responsible for all evaluation procedures described above.***

The data checklist were developed in consultation between GLNPO and state agency representatives, and provide a method for ensuring a minimum quality level for data put into the database. Any data points that are questionable, due to failing QA/QC requirements or inability to confirm questionable number (e.g. contaminant concentrations several orders of magnitude higher than other nearby sites), will be qualified, if possible, (see discussion in Section 3.4) or deleted from the data set. Note that all or only portions of a given data sets may be excluding from use in the database based on the screening criteria described above.

Additionally, since we are dealing with historical data, GLNPO representative must verify the current contact information for the Principal Investigator (PI). If GLNPO is unable to verify contact information for the PI, GLNPO personnel's contact information will be substituted for the PI's information.

3.2 Check Data In MS Excel Format

GLNPO personnel will be responsible for translating all selected data sets from the hard copy or electronic format to the MS Excel Query Manager reporting format. This translation process will require significant data input and manipulation and provides ample opportunities for typographical and data entry errors. In fact, this step is probably the most error-prone task of the entire project.

Therefore, in order to check for errors during the data entry process, all data (laboratory analysis and locational data) entered in the MS Excel format will be **double-checked, 100% number for number, in order to ensure 100% accuracy of the data input process**. This data check will entail the use of two (2) GLNPO personnel, and will proceed as follows:

1. One person will be responsible for the reviewing the original hard copy or electronic laboratory format (Person #1) and one person will be responsible for reviewing the MS Excel formatted data set (Person #2),
2. Person #1 will read off a line of data, including: site number, analysis performed, numerical analysis result, units of measure, and any accompanying qualifying code,
3. Person #2 will read off a line of data, including: site number, analysis performed, numerical analysis result, units of measure, and any accompanying qualifying code,
4. Persons #1 and #2 will confirm the accuracy of each line of data or make corrections as required,
5. Repeat Steps 2 through 4 until all lines of data have been checked,
6. Sign and Document QA/QC review on Data Quality Documentation Checksheet (Appendix A)

** GLNPO personnel are responsible for completing this portion of the QA/QC Evaluation.

3.3 Check Data In MS Access Format

The MARPLOT visualization software requires a relational database format for use in viewing the sediment data. Since MS Excel is not a relational database format the MS Excel spreadsheets must be converted to a relational database format. Therefore, after completing the QA/QC review described in Section 3.2 above, each data set will be converted from MS Excel format into MS Access format utilizing the conversion routines and technical documentation provided in Appendix D.

The conversion routines developed for this project have several QA/QC checks imbedded into the routines (see Appendix D for details). These imbedded QA/QC routines are helpful, but they are incidental to the overall QA/QC evaluation of the final database. The next critical step of the QA/QC evaluation is to ensure that the data has been properly converted from MS Excel format into MS Access format.

The conversion routines used to translate the data from MS Excel worksheets to a MS Access database are less error prone than the initial data entry steps. Additionally, errors in the conversion routines would tend to be universal, rather than individual (e.g. translation of all PAH data from ppm to ppb, etc). Therefore, although the same method will be used to check this converted data, as was used in Section 3.2 above, a less exhaustive process will be employed. The MS Access data sets will be **double-checked on a semi-random, 10% basis.** A total of 10% of all data points will be checked. The semi-random method, refers to the fact that instead of checking a random 10% of all data entered, 10% of all site locations will be checked for 100% of their data. This data check will entail the use of two (2) GLNPO personnel, and will proceed as follows:

1. Use of a random number generator to select 10% of station locations to check,
2. One person will be responsible for the reviewing the original hard copy or electronic laboratory format (Person #1) and one person will be responsible for reviewing the MS Access formatted data set (Person #2),
3. Person #1 will read off a line of data, including: site number, analysis performed, numerical analysis result, units of measure, and any accompanying qualifying code,
4. Person #2 will read off a line of data, including: site number, analysis performed, numerical analysis result, units of measure, and any accompanying qualifying code,
5. Persons #1 and #2 will confirm the accuracy of each line of data or make a note of errors encountered,
6. Repeat Steps 2 through 4 until all randomly selected lines of data have been checked,
7. If **ANY** errors are encountered the entire MS Access formatted data set should be **double-checked, 100% number for number, in order to determine if there are any imbedded errors in the conversion routines, or in the implementation of the conversion routines. Representatives should also check the MS Excel spreadsheets to determine if the original spreadsheets contained the identified errors.**
8. If ANY errors are encountered, NOAA representatives shall be contacted for trouble-shooting support and for assistance in determining if changes need to be made in the conversion routines or documentation (all data input and conversion activities shall stop until the errors have been identified and corrected.)
9. If no errors are discovered, Personnel shall sign and document QA/QC review on Data Quality Documentation Checksheet (Appendix A)

** GLNPO personnel are responsible for completing this portion of the QA/QC Evaluation.

3.4 Documentation Provided to Data Users

The relational database constructed through these efforts represents a secondary use of sediment chemistry and toxicity data. For most projects, the primary use of the data was for the grantees to determine and make sediment management decisions regarding current sediment quality conditions at a particular site. Often, the primary use is the only data use specified in a QAPP, and therefore, it is difficult to determine if the data collected was of sufficient quality to support the multitude of secondary uses that users of the database may envision.

The documentation contained within the database provides adequate information for most users to determine if the data provided is of sufficient quality to be utilized for their intended purposes. At the very least the user will be able to determine if additional QA/QC information is necessary to support their intended use. The database also contains contact and report availability information for the user to obtain additional QA/QC data if required.

Additionally, the data will only be available upon individual requests from GLNPO Sediment Assessment and Remediation Team members. Whenever, such requests are fulfilled, the full GLNPO MS Access formatted sediment database will be sent to the requestor accompanied by the qualifications provided below, and the data qualification codes provided in Table 1. Because

the relational database may be used independently of the MARPLOT software and MS Access is a universally available database system, no documentation will be provided on use of the MARPLOT visualization tool or MS Access.

QUALIFICATION

The sediment data contained in the database was collected and analyzed under an Quality Assurance Project Plan (QAPP) and/or Quality Management Plan (QMP) approved by GLNPO. However, the quality of the data contained in this database may not be sufficient for use for any purposes except the purposes outlined in the original QAPP/QMP document. IT IS THE RESPONSIBILITY OF THE USER TO ENSURE THAT THE QUALITY OF THE DATA IS SUFFICIENT TO MEET ITS INTENDED USE. The database contains contact information for the principal investigator, and the user is strongly advised to contact the PI to discuss any questions regarding quality assurance and quality control and potential uses of the data.

Table 2. List of Data Qualification Codes

GLNPO QUALIFIER CODES	
Code	**Description**
B	Analyte was detected in laboratory method blank.
E	Estimated Concentration. Analyte to internal standard ratio exceeds the range of calibration curve.
I	Estimated maximum possible concentration due to peak interferences.
J	Estimated Concentration. Result is greater than detection limit, but less than reporting limit.
LD	Lab Duplicate: Batch quality control for lab surrogate exceeds upper or lower control limits.
LS	Lab Surrogate: Batch quality control for lab surrogate exceeds upper or lower control limits.
M	MS/MSD recoveries exceed the upper or lower control limits.
MX	MS/MSD: Analyte was present in the original sample at a concentration X times greater than the spike concentration. Therefore, control limits for the MS/MSD samples are not applicable.
P	The lower of the two values is reported when the percent difference between the results of two GC columns is greater than applicable control limits.
Q	Results was qualitatively confirmed, but not quantified.
U	Analyte was not detected at or above the reporting limit.
X	Estimated Value. Analytes co-elution resulted in inability to differentiate different analytes.

** GLNPO personnel are responsible for providing the data users with the documentation described in this section.

3.5 Custodial Records and Documentation

3.5.1 Custodial Records

A separate GLNPO Sediment Database project file will be maintained for this project will be maintained for as long as the GLNPO Sediment Database is maintained. This project file will be stored at the GLNPO offices. A separate folder will be maintained for each dataset included in the sediment database. The following items will be maintained in the folder for each dataset:

1. Final approved QAPP or QMP,
2. Copy of the Laboratory Data Report Package (either electronic or hard copy),
3. Completed Post-Sampling QA/QC Audit Checklists (see Appendix C),
4. Final project report summarizing the data, and
5. Completed Data Quality Documentation Checksheet (see Appendix A)

3.5.2 Technical Documentation

Technical documentation on the data translation routines is contained in Appendix D. This documentation will be stored and maintained in the GLNPO Sediment Database project files for as long as the GLNPO Sediment Database is maintained. Whenever this documentation is updated, all previous versions of the technical documentation will be removed from the project files.

** Demaree Collier of GLNPO is responsible for maintaining the GLNPO Sediment Database project files. It is her responsibility to keep the files current. She is also responsible for delegating this responsibility to another member of the GLNPO Sediment Assessment and Remediation Team, if and when, she leaves the services of GLNPO.

4. Response Actions

Potential problems and erros on this project fall into three major categories: (1) Data entry errors, (2) imbedded conversion routine errors, and (3) incomplete or incorrect technical documentation.

<u>Data Entry Errors</u>
All data entry errors will be identified and corrected by USEPA GLNPO personnel. Scott Cieniawski and Demaree Collier will have the responsibility of identifying and correcting data entry errors utilizing the steps outlined in Section 3. No documentation of data entry errors is required.

<u>Imbedded Conversion Routine Errors and Incomplete or Incorrect Technical Documentation</u>
All problems involving conversion routines and technical documentation will be referred immediately to Jay Field of NOAA. Either Scott Cieniawski or Demaree Collier may contact Mr. Field directly. Response actions will be documented and carried out as follows (responsible party).

1. Identify and Document Problem in an E-mail (GLNPO personnel)
2. Contact Jay Field of NOAA via E-mail (GLNPO Personnel)
3. Identify and Correct Cause of the Problem (NOAA Personnel and/or Contractors)
4. Document Corrective Action in E-mail to Demaree Collier (NOAA Personnel)